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Institutional set-up of innovation policies: a systemic point of view. Belgian case study

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Abstract

This paper aims to develop an integrated framework for the analysis of the institutional set-up of innovation policies based on the innovation system context. To do so, a classification of national innovation policies described in the Erawatch database is realized, according to three aspects of the system: the objectives pursued, the instruments used and the organizations targeted by each examined policy measure. Taxonomy of those three dimensions is built from theoretical and empirical considerations and leads to the construction of functional matrices that shows the global distribution of all the national policy measures among objectives, instruments and organizations. The implementation of this model on Belgian policy measures permits a more global view of the interdependency between the three dimensions, shedding the light on the innovation system components targeted by public authorities.

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1. Abstract

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2. Introduction

Innovation is considered nowadays as a crucial process for the competitiveness and growth of our economies. It is one of the main objectives of public intervention, as testified by the numerous policies dedicated to the stimulation of innovation activities. The most striking example of this phenomenon is the willingness of the European Union to encourage its member states' R&D expenses up to 3% of their GDP, via the Lisbon 2010 and the Europe 2020 strategies. Another aspect of innovation, widely recognized by economists and policy-makers is also widely taken into account: its systemic nature. The most typical examples of this are the European Research Area initiative, which reflects the general trend toward increased cooperation between the actors of the innovation process, and the implementation of cluster policies, which bring together different actors of the innovation system around an innovation project in order to enhance the systemic dynamics of innovation and to foster competitiveness. The innovation system literature theoretically consolidates this systemic approach of innovation by public authorities. The evolutionary point of view related to the innovation system concept can thus be added to traditional evaluation techniques of evaluation policies, which not always consider innovation activities from a systemic angle. This latter perspective could complement the analysis of innovation policies with a deeper understanding of how those policies imbricate themselves in the whole innovation system, and what could be the main institutional configuration that could affect their implementation. In other words, quantitative considerations about policy incomes may be completed by an assessment of its institutional adequacy, i.e. the way it fits to the system and its specific characteristics and needs. As the innovation system concept is deeply rooted in the evolutionary literature, the first section of this paper is dedicated to a state of the art about this framework and its specific methods of analysis. The second section will focus on the modelization of a systemic tool for innovation policies analysis, which will be implemented on the Belgian policy measures in the last part of the study.

3. Theoretical Background

3.1. The innovation system concept

The systemic nature of the innovation process and its evolutionary heritage has been recognized by the economic literature since the late 80's. The concept of innovation system was first used by Freeman in his analysis of the Japanese science and technology policy. He examined the network of public and private institution involved in the Japanese innovation process, related with R&D development, knowledge transfer from abroad and absorption capacity of the education system. This study led to a first theoretical definition of the innovation system as *« the network of institutions in the public and private sectors whose activities and interactions initiate , import, and diffuse new technologies »* (Freeman 1987). Afterward, further theoretical backgrounds were set by the works of Lundvall (1992) and Nelson (1993), focusing on the determinants of innovation rather than its consequences, and including an institutional dimension in the analysis of the innovation process. Edquist (1997) gave a general definition of the innovation system as « *all important economic, social, political, organizational, institutional and other factors that influence the development, diffusion and use of innovations* » (Edquist, 1997, 2005).
Innovation is henceforth seen as a whole system involving its components and the interactions existing between them. The firm is no longer the focus point of economic analysis. Its environment has its own importance in terms of innovation system's efficiency (Metcalfe, 1995).

3.2. Innovation policies: a systemic point of view

The main justification for public intervention in the innovation process is what the literature calls the system failures (Malerba 1997, Carlsson & Jacobsson 1997, Smith 1999, Edquist & al. 1998, Woolthuis & al. 2005). The role of the state is to correct the imperfections in the functioning of the innovation system (Edquist 2001). Then, it is not only a matter of subsidizing R&D activities but also improving the institutional framework in which such activities take place. Given this assertion, a growing part of the literature is focusing on a complementary systemic approach to the traditional policy evaluations. Indeed, as evaluating performances before and after policy treatment is based on a strong ceteris paribus assumption, the environmental aspect of innovation policy may be not captured by the evaluation, leading to a misconception of an eventual implementation problem (Arnold, 2004). Using Pawson and Tilley's (1997) point of view, a realistic evaluation of a program should take the general context of implementation into account. In this sense, Arnold (2004) argue that bounded rationality of innovation actors implies a broader context for evaluation as the performance of one actor depends on performance of the whole system.
Regarding this, he proposed 3 levels for policy measures evaluations:

- Continuation of the traditional analysis of individual program with a focus on the implementation context
- Analysis of the overall health of the innovation system, with the idea that there is no optimization possible, leading to a continuous improvement process
- Bottleneck analysis, focusing on sub-systems of the innovation process, following the same rationale than the option cited above.

The analysis proposed in this paper focus on the second level of evaluation. As very few studies are dedicated to the general framework of innovation policy implementation, our contribution consists in providing an integrated framework for a systemic examination of a policy’s efficiency. Such an approach is of course not self-sufficient and should be seen as a complementary technique to the traditional ones..

Carlsson & al. (2002) highlighted some challenging points regarding the implementation of such evaluation techniques. Firstly, the dynamic character of the system may make the precise delimitation of its boundaries delicate. The level of analysis has to be specified for any innovation system analysis. In our case, as policies are generally settled at a national level, the latter will be used for examination.

Secondly, innovation performances depend not only on the level of analysis applied but also on the maturity of the system. The effect of a specific technology on different industries may differ. Those points have to be taken into account when setting the framework analysis, and for results interpretation. Thirdly, as system analysis remains static, the contribution of internal behaviors to long terms growth need a retrospective study.

3.3. Typologies of innovation systems

As the systemic nature of the innovation process is commonly accepted in the economic literature, a growing part of the studies dedicated to innovation systems focus on its numerous aspects and their incidence on the implementation of innovation policies. Typologies are then the most used method to capture the systemic dynamics of the innovation process. It allows a better understanding of causality and other relations in a systemic framework (Lundvall, 2007) and provide a theoretical concept for policy design taking into account the characteristics and needs of each region studied (Cooke, 1998). The literature based on typologies is characterized by two types of analysis: the case studies, allowing for theoretical conceptualizations of innovation systems and the statistical analysis, based on data analysis methods, providing a more empirical modelization of such system (Navarro & Gibaja, 2009). For a detailed overview of the literature on typologies of innovation systems, see table 1 in annex. The purpose of our study is to build a systemic tool that permits a case study typology, not for the innovation system itself but for policies implementation, to the purpose of a better understanding of how policy measures imbricate themselves in the system, and of their focus on particular system failures that could be diagnosed in an innovation system’s health evaluation.

4. Data and methodology

The aim of the paper is to design a theoretical framework for the mapping of innovation policies. Such a model would be based on a taxonomy including the components and actors involved in the innovation systems targeted by those policy measures.

The analytical outline used in this paper is based on the building of four functional matrices (Capron & Cincera, 2001), constructed by crossing the objectives, instruments and organizations that characterize an innovation system.

- **Functional matrix 1: the objectives – instruments matrix**, which describes which objective is targeted by each instruments used in the setting of a policy measure.
- **Functional matrix 2: the organizations-instruments matrix**, which gives an overview on the links between an instrument and the organization it targets.
- **Functional matrix 3: The organizations-objectives matrix**, which describes the organizations that are involved in the realization of which objective.

As the description of an innovation system may be theoretically very complex, empirical constraints may arise due to the lack of information available (Bruijn & Lagendijk, 2005). To avoid a possible shift between the theoretical conceptualization and the empirical verification of our typology, this model will be constructed based on the information available on the Erawatch Database and the INNO-Policy Trendchart which provide informations about innovation policy measures implemented in several countries, and the objectives pursed, the organizations targeted and the main instruments used in this context. Thus, a bottom-up approach will be implemented to set the framework of the analysis; as such a model has to be empirically verified to avoid the theoretical bias due to the possible complexity in the conceptualization of the innovation system.

Thus, each single policy measure implemented in the Member States of the EU-15 is analyzed in terms of priorities, beneficiaries and mode of intervention. As the Erawatch Database provide a harmonized canvas for the classification of those measures, it is possible to catch the underlying rationale of such public initiatives at a multi-countries level.

In a first step, a list of the objectives, instruments and organizations involved in the policy process is set, based on a global analysis of the available information on the Erawatch website. The common features of the EU-15 countries are highlighted to constitute the empirical background of the matrices. Coupled to theoretical considerations on the different dimensions of those matrices, this allows for a detailed description of the taxonomy.

In a second step, a thorough analysis of the policy measures taken one by one is done in order to classify them within each matrix. At this point of the study, the setting of the taxonomy remains flexible, as missing dimensions may be identified and added to the main analysis framework. The theoretical and empirical construction of the functional matrices is then a two-way continuous process.

At the end of this process, a profile is set for Belgian innovation policies, related to the relative weight of each dimension of the matrices. This classification allows for a complete overview of the institutional set-up of the innovation policies implemented within the country, setting a functional framework of analysis, which is not biased by cultural, political, geographical, economical and historical specificities of the innovation system.

The next section is dedicated to the theoretical and empirical considerations about the components of the innovation system that should be taken into account in the functional matrices.

5. Taxonomy of the innovation system components

The taxonomy proposed in this paper is based on the paradigm that the innovation process can be seen from a policy point of view as a complex system characterized by the objectives pursued by different organizations. The underlying mechanism of such a process is enhanced by innovation policies implemented by government through several specific instruments. Those three main components may be described in a more detailed way.

5.1. Objectives of the innovation system

Knowledge is commonly accepted by the literature as a key determinant of economic growth, and the core of all innovation system activities and performances. Analyzing the national innovative capacity is then a matter of understanding the mechanisms of creation, distribution and use of knowledge (Furman & al., 2002). As stated by the OECD (1996), the main key functions of the science system consist of knowledge production, which involves the creation and development of new knowledge, knowledge transmission, which concern activities such as education and development of human resources and knowledge transfer, regarding the process of disseminating knowledge among others.
Based on this theoretical rationale, The IS objectives are classified into three main categories:

- **The creative capacity** of the innovation system, which involves the aspects of the system related to production and development of knowledge
- **The transfer capacity**, linked to knowledge exchanges and networking between the actors of the innovation process
- **The absorptive capacity**, describing the ability of firms to acquire, develops and implements new knowledge at the internal level.

Those three dimensions are interdependent in the sense that a good creative capacity is linked to high levels of transfer and absorptive capacity, and a good transfer capacity implies a high level of absorptive capacity (Capron & Cincera, 2001). For a more detailed description of each objective see table 2 in annex.

5.2. Public instruments for the innovation system

With the raise of the knowledge based economy and the development of the IS literature, more and more innovation policies are initiated by governments to correct the innovation system failures (Edquist, 2005) and enhance the competitiveness of their territories.
The systemic nature of innovation is translated through the implementation of STI measures that covers not only the R&D activities and performances but also, human capital investment, innovation incentives, clusters circumstances and the quality of linkage (Furman & al., 2002). Moreover, such policies may be seen as "*the integral of all state initiatives regarding science, education, research, technological development, and industrial modernization. Thus, innovation policy is a broad concept that contains research and technology policy and overlaps with industrial, environmental, labour and social policies.* "*Public innovation policies aim to strengthen the competitiveness of an economy, or of selected sectors, in order to increase welfare through economic success*" (Kuhlmann and Edler, 2003).

The information regarding the instruments used in the policy measures, available on the Erawatch Database, is classified according two theoretical canvases:

- The Demsetz (1969) criteria: a specific policy should account for the encouragement of a wide variety of experimentation, direct investment away from unpromising varieties of experimentation and promotion of the dissemination of knowledge.
- Edquist and Borras (2012) also give a general framework for the classification of innovation policy instruments. They make a distinction between regulatory instruments, concerning the legal framework of innovation activities, the economic and financial instruments (by cash or kind), that describe the different pecuniary means for public intervention and the soft instruments, related to the indirect action of governments on the IS through education, labor, etc….

Based on this theoretical background, three main types of instruments have been identified:

The Science and Technology Support Measures: the main financial and fiscal instruments used in isolation or combination to stimulate R&D. Those instruments include direct funding, fiscal incentives, risk capital, loans and equity, and public participation on the markets. They are systematically associated to other types of instruments in a policy mix point of view.
The Science and Technology Diffusion Measures: the instruments used to create an infrastructure that encourages a rapid spread of awareness and knowledge of innovation. This concerns innovation awareness, creation of firms, valorization of R&D results, improvement of innovative capacities of firms, mobility, internationalization, support to collaborations and promotion of public science base. Speaking of internationalization, it does not only concern critical mass and visibilities on the global markets, leading to a worldwide open innovation system. Prevention of brain-drain and protection of the national science base also have to be highlighted.
The Science and Technology Framework and Regulatory Measures: concerning public actions that aim to improve the general economic performances to indirectly enhance competitiveness and innovation. This category includes macroeconomic conditions, workforce, socio-economic and regulatory structures that directly influence the innovation system's performances.
For a more detailed description of the taxonomy, see table 3 in annex

5.3. Organizations in the innovation system

The term "organizations" designates here the actors involved in the innovation process. One has to mention that this term is preferred to the term "institutions", as it is referred in the Erawatch database. Indeed, in a critic of the conceptual vagueness of the institution concept in the literature, Edquist (1997) proposed a terminology that is commonly accepted nowadays: organizations refer to the actors of the innovation process and institutions are the rules of the game within the environment of the actors.
A systemic point of view on the innovation process implies that its actors are involved in different sectors of economic activities, varying from the industry to education or public spheres. Those organizations are characterized by the function they perform within the system and the interdependencies that exist between them. This main feature of the innovation system is captured by the Erawatch classification in terms of organization targeted by the specific policy measure.

Five categories have been identified for this dimension of the innovation system:

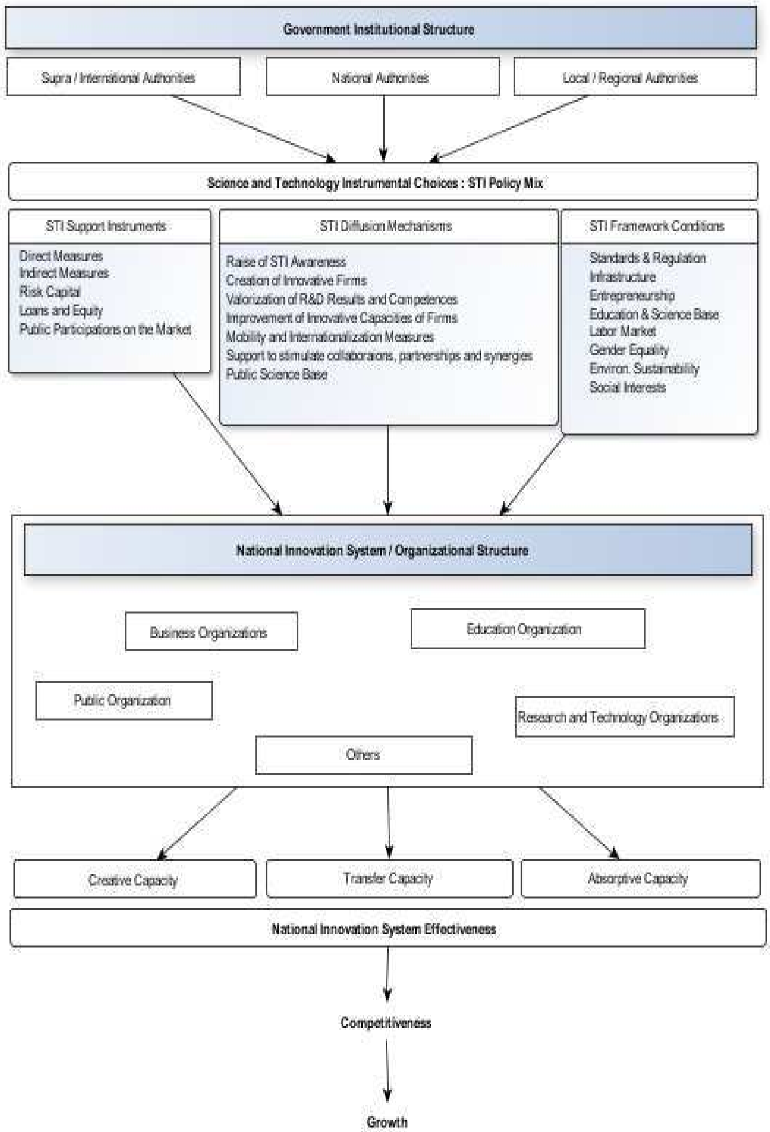
Business Organizations: including firms, consultancies and venture capital providers. This category concerns all the organizations close to the market, usually involved in the later stages of R&D results implementations.
Education Organizations: including all the organizations involved in the education system, from secondary school to universities.
Research and Technology Organizations: including all the actors involved in R&D and technological activities
Public Organizations: including all the public actors taking part in the innovation system's activities, to produce knowledge of facilitate innovation activities
Other Organizations: including individuals (researchers and scientists) for a great part, but also professional association, interest groups or NGO's, not directly involved in the innovation system but having an indirect influence on its activities.

For a more detailed description of this dimension, see table 4 in annex

The institutional set –up of the innovation policies can be drawn from this taxonomical information, as they are classified according to these three dimensions and all the sub-dimensions that constitute them. The idea is to get a global view on the governance of science technology and innovation within an innovation system. It is a matter of understanding the underlying institutional configurations between the different components of the system. The national level is chosen for the analysis, as policies are most of the time derived from national government initiatives.

The following diagram shows the institutional path of public action within the innovation system. As stated by Edquist and Borras (2012), in a first step, public authorities have to implement instrument mixes, related to specific problems identified in an innovation system. Thus, policy instruments are considered as systemic, and a policy mix is defined as *"the specific combination of innovation-related policy instruments which interact explicitly or implicitly in influencing innovation intensities"* (Edquist & Borras, 2012). This systemic point of view highlights the fact that government can improve the national innovation system effectiveness through actions in other fields than the technological ones. This concerns parts of the financial, education, labor, and environmental sectors involved in the innovation process (soft instruments). In a second step, IS organizations assimilate these policy actions in their organizational structure, enhancing their creative, transfer or absorptive capacities, and contributing to the IS effectiveness. This underscores the necessity of an upstream analysis of innovation policies, as the effectiveness of the system is a matter of correctly identifying the systemic failures and implementing adequate policy measures.

Diagram 1: The STI Governance



Source: Adapted from Capron & Cincera (2001) and Bikar & al. (2005)

6. Functional Matrices

6.1. Construction

Such a theoretical taxonomy has to be verified on an empirical level. In order to do this, each national policy measure detailed in the Erawatch database is classified within functional matrices crossing three main dimensions: the objectives pursued, the instruments used and the organizations targeted by the public intervention. Each measure included in a matrix has the same weight, and if it is concerned by more than one element in each dimension, its weight is divided by the number of sub-dimensions[1]. This is a way to obtain an overview of

[1] One policy has a weight of 1 for each of the three dimensions of the matrix. If it is concerned by two objectives, each objective will be given a weight of ½ in the database. Moreover, if the same measure targets

completeness of the policy measures within an IS and to avoid its double counting. By doing this, it is possible to see which percentage of all national policy measures is allocated to each dimension, giving a contingency table with frequencies allowing for a global picture of the distribution of the measures given their related objectives, instruments and organization.
It is important to note here that the results cannot be interpreted in terms of financial means, as the taxonomy is only based on qualitative considerations about the functioning of an innovation system. Indeed, one main STI issue might be considered through one single measure with substantial means and minor issues might be subject to many soft measures. The results should rather be interpreted as the relative importance of different priorities set by governments in terms of innovation, and are more related to an institutional point of view on policy efficiency.

6.2. Illustration for Belgian innovation policies

6.2.1. The Belgian innovation system

The Belgian innovation system is as complicated as the federal structure of the country. Indeed, Belgium is a federal state composed by three regions. Each region has its own agencies and STI (science, technology and innovation) policies and its own innovation structure. Most of the policies analyzed in this study are then implemented at a regional level. But some emanate from the federal government (mainly those dedicated to the legal or fiscal framework of innovation activities). As the country level were chosen to facilitate further comparisons with other national innovation system, all the regional policy measures have been aggregated at the national level. Nevertheless, the highly decentralized nature of STI governance cannot be neglected and has to be taken into account in the analytical context of results' interpretation.

6.2.2. Preliminary results

The functional matrices including relative weights attributed to each dimensions, expressed in absolute terms are shown in tables 4,6 and 7 in annex. The main results might be presented as follow:

Table: Distribution of the policy measures among the objectives dimension

Objective	**Percentage of policies**
Creative capacity	38,07%
Transfer capacity	34,09%
Absorptive capacity	27,84%

It has to be noticed that these observations concern the number of policy measures dedicated to each dimension, according to the claims of governments, not the corresponding budget. Globally, the distribution of policy measures among the three objectives of the innovation system seems well balanced. Most of public actions target the creative capacity of the system with an emphasis on upstream innovative activities, fundamental and applied R&D. Creation of new firms and innovative activities and basic research seem to be the main focus of Belgian public authorities. Concerning transfer capacities, one could assess that governments give a particular attention to knowledge transfers (17,05% of the measures) and knowledge networking (8,52%). This reflects the willingness to enhance cooperation between innovation

three organizations, each of them will be given a weight of 1/3. So if a measure concerns two objectives and three organizations, each couple objective-organization will be given a weight of 1/6 (1/(2x3)).

actors, which have been explicitly set as policy priorities by regional and federal government for the last decades, and often characterized by research-industry linkages. Regarding absorptive capacities, an emphasis is put receptivity (9,09%) and acquisition (6,25%) of knowledge and technologies. These objectives are strongly linked to SMEs that can't always afford the means they have to implement to reinforce their absorptive capacity.
This statement can be linked to the distribution of policies among the organizations dimension.

Organizations targeted	Percentage of policies
Business organizations	51,36%
Education organizations	1,77%
Research and technology organizations	30,04%
Public organizations	1,89%
Other organizations	14,94%

As shown in the functional matrices 2 and 3, firms are the main targets of innovation policy measures. SMEs are the most important ones (24, 34%). This can be explained by the willingness of authorities to permit the access to the innovation system dynamics as enhancer of the innovation capacities of firms that can't make the most of their environment advantages without public intervention. Research and technology organizations are also the main beneficiaries of the measures, especially the higher education research units (universities), in their attempt to integrate the innovation process to a greater extent. Surprisingly, universities in their educations functions and public organization are not as often cited in policy claims as expected.

Instruments	Percentage of policies
STI support measures	38,14%
STI diffusion measures	36,84%
STI framework measures	25,02%

Concerning the instruments, support measures, and direct funding (29,07%) in particular are the most used, but always in a mix with other type of measures, according to the policy mix principle. The diffusion measures concern most the improvement of innovative capacities of firms (15,68%), reflecting that the innovation environment is an important parameter taken into account by the authorities, this is confirmed by the relatively important weight of measures targeting the infrastructure in general (6,17%). Another aspect of this tendency is implementation of numerous measures concerning the promotion of education and the awareness of its link to research.
Mobility of researcher and internationalization are relatively less important in terms of number of measures implemented. The same conclusion has to be made for public science base. This observation has to be nuanced by the fact that this study is based on the number of policy measures implemented, not on the amount of budget dedicated to those subdimensions.

7. Conclusion

7.1. Advantages and drawbacks

The functional matrices allow for a global view of the institutional set-up of innovation policies, highlighting the components of the innovation system that are more or less targeted by public intervention. In our example, basic research, cooperation and absorptive capacities of SMEs are the main concerns of public authorities, contrary to public science base or mobility and internationalization of research activities. This gives us a first hint about policy intentions of governments, but is has to be nuanced by the fact that a less cited aspect in terms governments' claim about policies implementation can be endowed with a relatively more important budget.

7.2. Perspectives for further research

The integrated framework proposed in this paper is a very first step to the construction of a systemic tool for innovation policies evaluation. The functional matrices permit a global view of the interconnections existing within the innovation system, allowing for a precise mapping of public policies' targets. However, an empirical verification extended to the EU-15 or EU-27 member states could be realized to assess the robustness of such a model. Moreover, as the functional matrices only take the relative weight of each dimension into account, it could be interesting to add a quantitative dimension to the analysis by integrating the budgets allowed government to each dimension, in order to precise the targets of policy measure while keeping the global view of a systemic dimension.

8. References

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9. Annexes

Table 1: Typologies of innovation systems

Authors	Date	Type of IS	Characteristics	Strengths	Limits
Pavitt	1984	Sectoral	Description of sectoral patterns from a technical change perspective. It follows from this description a three parts taxonomy based on firms 1) supplier dominated, 2) production intensive, 3) science based	Classification of firms from all secors according to their significant innovations	Analysis limited to business organisations
Lundvall	1992	National	Definition of the elements that compose NIS: 1) internal organisation of firms; 2) interfirm relationships; 3) role of the public sector; 4) institutional set-up of the financial sector; and 5) R&D intensity and R&D organisation	Put a central stress on the institutional structure within NIS.	Focus only on the institutional dimension of such systems. Various institutional profiles across countries. Missing element: education and training system (pp. 14-15).
Nelson	1993	National	Comparative analysis between 15 NIS, from large high-income countries to lower income countries.	All 15 studies unified by a broad consensus on the definitions and concepts: "*national innovation system* ", "*system* ", and "*national* ".	Institutions limited to R&D actors.
OECD	1996	National	Three key functions of the science system in the knowledge-based economy: a) knowledge production; b) knowledge transmission; and c) knowledge transfer.	Generic terms to explain the processes of creation, distribution and use of knowledge.	General description; lack of a detailed typology of these functions.
Amable et al.	1997	Social	Description of the sensitive variables in IS regarding to Science, Technology, Industry, Human Resources, Education and Training, and Financing. New concept: *Social System of Innovation* .	Typology of 12 industrialised countries into three main groups according to their performance profiles. The *social* concept is free from spatial issues.	Given evolutionary approaches, comparison of the performance of SSI may be difficult over time since the social and economic context always change and evolve (p. 163).
Carlsson	1997	Technological	Four basic assumptions underlying TIS: 1) the system as a whole is the primary unit of analysis, not its components; 2) the systems are not static, but dynamic; 3) technological opportunities are unlimited, so that it is impossible to identify all possibilities; and 4) there is bounded rationality.	General framework for the analysis of TIS. Emphasis on the interactions between technological players and institutions. Evolutionary dimension.	An innovation system is not only about enhancing technologies, economic growth and profit maximisation. Also, other societal objectives such as environmental sustainability and social equity.
Edquist and Johnson	1997	-	Focus on the central position of institutional set-ups in the innovation system, especially because of interactive and cumulative learning processes.	Clarification of the concept of 'institutions'. Taxonomies of institutions and identification of their five main functions in relation to innovations. Distinction between organisations and institutions.	Theoretical work; need for empirical verification (pp. 60-61).
Cooke	1998	Regional	Conceptualization of a RIS typology based on 1) governance dimension linked to technology transfer activities. A distinction is made between grassroots, network and dirigiste RIS according to initiation modalities of such activities in the system; and 2) business innovation dimension. The RIS will be localist, interactive or globalized according to the degree of internationalization of the innovative activities within the system.	One of the first conceptualizations of innovation system typology, based on case strudies. Often used as theoretical framework for NIS typologies.	Theoretical typology. Need for further specifications in terms of indicators used.
Capron and Cincera	1999	Regional	Typology of European regions according to their technological intensity.	Distribution of EU-15 regions (except Luxembourg) into five technological clusters.	Technological clustering distributed according to 2 dimensions: 1) creative capacity and 2) labour productivity.

Authors	Date	Type of IS	Characteristics	Strengths	Limits
Asheim & Isaksen	2002	Regional	Classification of Norvegian regions according to the extent to which they are internally of externally integrated. The study is focused on location of knowledge organizations, the interactive or linear knowledge flows and the stimulus for cooperation. This study leads to three categories of IS: 1) Territorially embedded regional innovation networks, 2) regional networked innovation systems, 3) regionalized national innovation system	The classification captures the dynamics of innovation flows within the RIS.	Study limited to Norvegian regions
European Commission	2002	National	National innovation policy measures classified according to 18 innovation objectives.	Harmonised classification of innovation policy measures from the various EU-25 Member States. Representative list of national innovation policy measures. Budget indicators for a lot of national policy measures and European Innovation Scoreboard.	Confusion between concepts: certain so-called "objectives" may actually be better identified as instruments (e.g. Financing, Taxation). Non-exhaustive list of national innovation policy measures.
Niosi	2002	National	Recognition of both inefficiency and ineffectiveness of NIS's institutions. Proposal for a benchmarking approach of NSI.	Examples of indicators (benchmark) of NIS performance in terms of efficiency and effectiveness.	Theoretical work; need for empirical and/or quantitative verification.
Chang and Shih	2003	National	Comparative analysis between two distinct SI (Taiwan and China) by using a framework based on six kinds of functions of generic types of institutions (i.e. policy formulation, performing R&D, financing R&D, promotion of HR development, technology bridging, and promotion of technological entrepreneurship), as well as on four types of interactions among these institutions (i.e. R&D collaboration, informal interaction, technology diffusion, and personnel mobility).	Analytical framework for studying a single NIS as well as for comparing IS in different countries.	Qualitative description of each institution function and their related interactions. Non-exhaustive framework.
Buesa et al.	2004	Regional	Identification of four factors determining RIS: 1) regional and productive environment for innovation; 2) role of universities; 3) role of the civil service; and 4) role of innovative firms.	Multivariate data analysis (e.g. factorial analysis, cluster analysis) in order to provide a typology of Spanish regions. Wide range of indicators for each factors determining RIS.	Analysis limited to the Spanish RIS.
Malerba	2004	Sectoral	Descriptive analysis of the differences and similarities in the structure, organisation and boundaries of sectors. Identification of the three main factors affecting innovation as well as the commercial performance and international competitiveness of firms and countries in the different sectors: a) Knowledge and Technologies; b) Actors and Networks; and c) Institutions.	Multidimensional, integrated and dynamic view of sectors (including market and non-market interactions).	"Taxonomies of sectoral systems have to be constructed. Here, comparative work is particularly relevant. These taxonomies should group sectoral systems in terms of elements, structure and dynamics, so that common features among sectors can be identified and a general description of their characteristics can be proposed" (p. 503).

Authors	Date	Type of IS	Characteristics	Strengths	Limits
Balzat & Pyka	2005	National	Classification of 18 NIS of the OECD area by clustering methods based on: 1) innovative efforts, 2) institutional framework, 3) knowledge base, 4) openness, 5) financial conditions, 6) sectoral specificities	Analysis of OECD countries taking territorial diversity into account. The study shows that sectoral specificities are crucial to explain (dis)similarities between NIS.	Clustering methods only allow for a broad classification of NIS
Tödtling & Trippl	2005	Regional	Classification of RIS according to their preconditions for innovation, networking and innovation barriers. This study led to the identification of three types of RIS, their specific problems and needs for innovation policies: 1) peripheral regions(organizational thinness); 2) old industrialized regions (lock-in); 3) metropolitan regions (fragmentation).	Classification based on case studies and a systemic failures point of view. Practical guidelines for policies implementations.	Broad analysis, should be used as a general framework for more specific analysis.
Muller & al.	2006	Regional	Typology of innovation capacities for the New Member States and Candidate Countries to EU entry. Focused on 55 regions of Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Lituania, Latvia, Malta, Poland, Romania, Slovenia and Slovakia, and based on: 1) knowledge creation, 2) absorptive capacity, 3) diffusion capacity, 4) demand, 5) governance capacity. A principal component analysis is applied to identify 5 types of regions: 1) Capital regions, 2) regions with tertiary growth potential, 3) skilled manufacturing platform regions, 4) industrially challenged regions, 5) lagging behind agricultural regions	The typology allows to identify the main failures of each regional system and the main policy measures needed to catch up with the EU member states	The indicators used are specific to the problematic stressed in the paper.
Navarro & al.	2008	Regional	Classification of the 186 regions of the EU-25 according to their eco-technological development and sectoral specification. The dimensions analyzed are: 1) the socio-economic characteristics of the regions, 2) the capacity to transform R&D into innovation and economic growth, 3) the economies of agglomeration, 4) the absorptive capacity, 5) the development of R&D supporting structure, 6) the knowledge creation capacity	Analysis of the EU-25 regions allowing for a global European typology, using PCA and clustering methods	Limitations in data availability
Navarro & Gibaja	2009	Regional	Classification of the Spanish regions according to their level of economic and technological development and their sectoral specialization, using statistical data analysis. The authors characterized the RIS by its socio-economic setting, the government subsystem, the innovation supporting subsystem,the business subsystem, S&T and innovation output, economic output and internationalization	Creation of an integrated framework for innovation system analysis based on data analysis. The EU-25 regions context is taken into account.	Analysis limited to the Spanish regions. Limitations in regional data availability make interactions between actors and government intervention difficult to assess.

Table 2 : Objectives of the innovation system

Creative Capacity	
Upstream Innovative Activities	Initiatives in order to ease the creation of start-ups and innovative enterprises and open up new markets for promising products, processes and services; improvement of the equity capital base of organisations; improvement of competition by innovation enhancement; encouraging enterprises' STI investment; promotion for new innovative activities within enterprises; support for feasibility studies and highlight of innovation opportunities; etc.
Technology Acquisition	In order to promote technology upgrading through the introduction and utilisation of modern and efficient technology in the manufacturing and physical development of existing and new products or processes; as well as to enhance the competitiveness level of firms to enable them to compete globally. Technology acquisition may include: technology licensing; acquisition of patent rights, prototypes and design; training; and foreign expert sourcing.
Fundamental R&D	It refers to the research and experimental development activities mainly carried out by the Higher Education Institutions.
Applied R&D	It refers to the research and experimental development activities mainly carried out by the Private Organisations and the Research Institutes (public or private).
Government R&D	It refers to the research and experimental development activities ordered by the public Authorities or performed by public research organizations.
Downstream Innovative Acitivities	Other preparations for production linked to innovative activities: tooling up and industrial engineering, development of prototypes, design, other capital acquisition, production start-up, marketing for new or improved products, training, and software (definition derived from the Oslo Manual).
Transfer Capacity	
Knowledge Exchanges	Informal interactions among the actors that facilitate upstream and downstream linkages on tacit knowledge. By instance: forums, scientific conferences, etc.
Technology Exchanges	Informal exchanges of technology among the actors of the innovation system. By instance: feedback opinions from final users on a product, process, or service.
Knowledge Transfer	Formal transfer of know-how and/or technical knowledge from one organisational setting to another. It may comprise informal knowledge exchanges.
Technology Transfer	Use of the technology or technical information outputs (e.g. patents, licences, dissemination of equipment, technical information, related skills to users, etc) issued by a party external to the project. Technology transfer may occur at each stage of the innovation process, as technology acquisition only takes place in the launching of new innovations. It may comprise informal technology exchanges (Kingsley et al., 1996).
Knowledge Networking	When knowledge is shared, developed and evolved. It is more than access to information, because it also looks into the unknown. It is more than using the rules and inferences of expert systems, because it is about knowledge that is evolving.
Technology Networking	Share of existing technologies and development of these technologies, and related R&D activities, through the contribution of different innovation actors. It builds up R&D group activities while tighten close co-operation. It may comprise technology informal exchanges and technology transfer.
Absorptive Capacity	
Receptivity to Knowledge/Technology	In order to enhance the human capabilities and awareness for learning new or existing knowledge and/or technologies.
Accessibility to Knowledge/Technology	It can be defined as a well-shaped completeness of education and training channels, as well as all other socio-economic process. By instance, the society needs to offer the largest range of higher education institutions, vocational training institutions, and apprenticeship institutions that should provide a wide variety of educational and professional tuitions/degrees.
Acquisition of Knowledge/Technology	It embodies goods and services purchases, reverse engineering, and physical capital investment. It is directly linked to the infrastructure and the operational functioning of the innovation institutional actors (e.g. universities, research institutes, etc), and is not devoted to the innovative activities in themselves.
Distribution of Knowledge/Technology	Adequacy and quality of the knowledge/technology transmission system (e.g. education, training, administrative procedure, etc).
Updating Knowledge/Technology	Capability of learning and applying new skills. Diffusion of new knowledge/technology to the innovation institutional actors (e.g. business organisations, public authorities, population, etc).
Implementation of Knowledge/Technology	It embodies: hiring of human capital, human capital mobility, use of new or existing technologies, and linkages between education, vocational training and the professional world.

Table 3: Instruments used in policy measures implemented in the innovation svstem

STI Support Measures (Economic and Financial Instruments)	
Direct measures	Grants; Funding through procurement; Subsidies; Innovation prizes; Premium voucher based grants; Scholarships for PhD students
Indirect measures	Tax incentives; Fiscal incentives in support of the diffusion of innovative and technological products and services
Risk capital measures	Venture capital; Support to risk capital and seed funding
Loan and equity measures	Subsidized loans; Reimbursable loans; guarantees
Public participation on the market	(Green) Public procurement
STI Diffusion Measures	
Raise STI Awareness	Increasing awareness on S&T; Awareness and understanding of innovation perspectives
Creation of innovative firms	Support to innovative start-ups; Support to academic spinoffs; promoting business angels
Valorisation of R&D results and competences	Implementation of new product or service; Commercialization of R&D; Bridging the gap between laboratories and markets
Improvement of innovative capacities of firms	Support to organizational innovation; Support to innovation management and advisory services; Business support through workshops, training and consultancy; Recruitment of skilled personnel in entreprises; Direct/Indirect support to business R&D; Support of sectoral innovation in manufacturing; Support to innovation in services
Mobility	Mobility of researchers (e.g. brain-gain, transferability of rights)
Internationalization	Prevention of brain-drain; Measures targeting the return of researchers working abroad; International competition; Integration to the European innovation programs; Measures to attract foreign scientists in the domestic innovation system; International attractiveness; Measures targeting the entry on foreign markets
Support to stimulate collaborations, partnerships and synergies	Cluster framework policies; R&D cooperation (joint projects); Collaborations between universities and entreprises; Stimulation of university/industry linkages; International cooperation;
Public science base	Cooperation between public research units and industry; Public-private investment around research projects; Measures to attract researchers in the public sector; Application of public research results; public-private partnerships; Valorisation of public research
STI Framework and regulatory measures	
Standards and Regulations	Support to the innovative use of standards; Legislation (regulation instruments);
Infrastructure	Support to the creation of a favourable innovation climate; Support infrastructure (transfer office; training of supporting staff); Innovation strategies; Strategic technology policies, Horizontal policies in support of financing; Other horizontal policies
Support to policy making	Strategy policy documents; Policy advisory services; Activities of official advisory and consultative forum
Intellectual Property Rights	Measures to raise awareness and provide general information on IPR; Consultancy and financial incentive to the use of IPR; Drafting and implementation of legislation which provides intellectual property right; Promotion of IPR
Entrepreneurship	Climate for entrepreneurship;
Education and Science Base	Awareness of creation and science education; Relation between teaching and research; Policy measures concering excellence,elevance and management of research in universities; Stimulation of PhDs; Recruitment of PhDs; Valorisation of knowledge production in universities
Labor market	Recruitment of researchers; Job training of researcher and other personnel involved in innovation; Raise of salaries; bonuses and promotions; Employment condition for researchers; Career development (long term contracts with university researchers); S&T formation promotion; Fighting unemployment of the highly skilled; Increasing the availability of qualified research workforce; Improve productivity and quality of working life
Gender Equality	Human resources solutions for women; increasing women employment in the innovation sector;
Environmental sustainability	Support and guidelines on innovative green public procurement; Developing research in sustainable energies
Social interests	Stimulation of entreprises in disadvantaged communities; Steering course of technological development in a more human direction

Table 4: Organizations of the innovation system

Business Organizations	All companies Small and Medium Enterprises New technology based firms / New knowledge intensive service firms Business organizations per se (Chambers of commerce, business associations, banks…) Firms that do not perform R&D yet International companies establishing on national territory Consultancies and other service providers (non-profit) Venture Capital providers
Education Organizations	Higher Education Institutions (Education function) Other Public Education Institutions (Secondary…) Private Institutions for Education / Lifelong learning Students, teachers and general public
Research and Technology Organizations	Higher Education Institutions research units Technology and innovation centres (non-profit) Other non-profit research organizations (not HEI)
Public Organizations	Public Research Organizations Federal Institutions with R&D activities Public Administration Other Public Actors
Other Organizations	Associated Professional Networks Interest Organizations NGOs

Table 5 : The Objectives-Instruments matrix

Intruments	STI Support Measures				STI Diffusion Measures							STI Framework Measures													
Objectives	Direct Measures	Indirect Measures	Risk Capital Measures	Loans and Equity Measures	Public participation on the market	Raise STI Awareness	Creation of innovative firms	Valorisation of R&D Results and Competences	Improvement of innovative capacities of firms	Mobility	Internationalization	Support to stimulate collaborations, partnerships and synergies	Public science base	Standards and Regulations	Infrastructure	Support to policy making	Intellectual Property Rights	Entrepreneurship	Education and Science Base	Labor market	Gender Equality	Environmental sustainability	Social interests	Weight of specificobjectives	Relative weight of objectives
Creative Capacity	6,94	1,33	0,53	2,92	0,00	0,00	3,95	0,00	4,24	0,78	0,70	1,71	0,00	0,00	2,37	1,07	1,13	0,67	3,35	1,28	0,00	0,20	0,33	33,50	38,07%
Upstream Innovative Activities	1,00	0,25	0,33	1,75			3,75		0,42						0,67			0,67		0,17				9,00	10,23%
Technology Acquisition				0,50					0,33			0,50					0,17							1,50	1,70%
Fundamental R&D	3,87									0,78	0,70	0,42			0,50	0,17			2,62	1,12			0,33	10,50	11,93%
Applied R&D	1,41	1,08		0,17					2,21			0,79			0,62	0,37	0,63		0,53			0,20		8,00	9,09%
Government R&D	0,33														0,33	0,33								1,00	1,14%
Downstream Innovative Acitivities	0,33		0,20	0,50			0,20		1,28						0,25	0,20	0,33		0,20					3,50	3,98%
Transfer Capacity	10,07	0,45	0,17	0,25	0,00	0,00	1,33	0,25	2,69	2,83	1,67	2,74	0,38	0,00	2,19	1,20	0,92	0,50	1,62	0,75	0,00	0,00	0,00	30,00	34,09%
Knowledge Exchanges	0,96						0,17		0,29	0,79		0,46			0,17	0,17								3,00	3,41%
Technology Exchanges	0,38								0,38	0,13		0,13												1,00	1,14%
Knowledge Transfer	4,66	0,25	0,17				1,17	0,25	1,45	1,08	0,58	0,50	0,38		1,33	0,70	0,79	0,50	0,45	0,75				15,00	17,05%
Technology Transfer	0,96								0,13			0,46					0,13		0,83					2,50	2,84%
Knowledge Networking	2,77	0,10		0,25					0,35	0,83	1,08	0,85			0,60	0,33			0,33					7,50	8,52%
Technology Networking	0,35	0,10							0,10			0,35			0,10									1,00	1,14%
Absorptive Capacity	8,08	1,33	0,17	1,33	0,00	0,00	0,95	0,00	6,87	0,00	0,00	1,20	0,13	0,00	0,88	0,67	1,24	0,00	0,67	1,00	0,00	0,00	0,00	24,50	27,84%
Receptivity to Knowledge/Technology	3,67	0,58					0,33		1,17			0,33			0,58	0,50	0,33		0,50					8,00	9,09%
Accessibility to Knowledge/Technology	0,67	0,13		0,50			0,13		1,79			0,17								0,63				4,00	4,55%
Acquisition of Knowledge/Technology	1,37	0,25		0,58			0,33		1,28			0,20	0,13		0,29	0,17	0,62		0,17	0,13				5,50	6,25%
Distribution of Knowledge/Technology	0,13	0,13							0,13								0,13							0,50	0,57%
Updating Knowledge/Technology	2,00								2,00			0,50												4,50	5,11%
Implementation of Knowledge/Technology	0,25	0,25	0,17	0,25			0,17		0,50								0,17			0,25				2,00	2,27%
Weight of Specific instruments	25,08	3,12	0,87	4,50	0,00	0,00	6,23	0,25	13,80	3,62	2,37	5,65	0,50	0,00	5,43	2,93	3,28	1,17	5,63	3,03	0,00	0,20	0,33	88,00	
Relative weight of instruments	28,50%	3,54%	0,98%	5,11%	0,00%	0,00%	7,08%	0,28%	15,68%	4,11%	2,69%	6,42%	0,57%	0,00%	6,17%	3,33%	3,73%	1,33%	6,40%	3,45%	0,00%	0,23%	0,38%		

Table 6 : The Organization – Instruments Matrix

Intruments / Organizations	STI Support Measures					STI Diffusion Measures								STI Framework Measures											
	Direct Measures	Indirect Measures	Risk Capital Measures	Loans and Equity Measures	Public participation on the market	Raise STI Awareness	Creation of innovative firms	Valorisation of R&D Results and Competences	Improvement of innovative capacities of firms	Mobility	Internationalization	Support to stimulate collaborations, partnerships and synergies	Public science base	Standards and Regulations	Infrastructure	Support to policy making	Intellectual Property Rights	Entrepreneurship	Education and Science Base	Labor market	Gender Equality	Environmental sustainability	Social interests	Weight of organizations	Relative weight of organizations
Business Organizations	10,95	2,32	0,87	4,00	0,00	0,00	4,88	0,08	10,94	0,23	0,00	2,99	0,25	0,00	2,04	0,43	2,71	0,73	0,61	1,10	0,00	0,00	0,06	45,20	51,36%
All companies	4,57	1,53	0,53	1,00			1,02	0,08	4,93	0,23		1,48	0,25		1,37	0,27	1,57	0,40	0,30	0,19				19,73	22,42%
Small and Medium Enterprises	4,60	0,75	0,33	2,75			3,87		4,70			1,31			0,42	0,17	1,03	0,33	0,24	0,92				21,42	24,34%
New technology based firms / New knowledge intensive service firms	0,23								0,11						0,12		0,11		0,04					0,61	0,69%
Business organizations per se (Chambers of commerce…)	0,07	0,03							0,03			0,03			0,07				0,04					0,28	0,32%
Firms that do not perform R&D yet																								0,00	0,00%
International companies establishing on national territory																								0,00	0,00%
Consultancies and other services providers (non profit)	1,47			0,25					1,17			0,17			0,06								0,06	3,17	3,60%
Venture Capital providers																								0,00	0,00%
Education Organizations	0,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,28	0,29	0,00	0,00	0,36	0,00	0,00	0,07	0,06	1,56	1,77%
Higher Education Institutions (Education function)	0,37														0,21	0,23			0,23			0,07	0,06	1,17	1,33%
Other Public Education Institutions (Secondary…)	0,09														0,04	0,06			0,09					0,28	0,32%
Private Institutions for Education / Lifelong learning	0,04														0,04				0,04					0,11	0,13%
Students, teachers and general public																								0,00	0,00%
Research and Technology Organizations	9,51	0,43	0,00	0,50	0,00	0,00	0,78	0,08	2,30	1,04	0,71	2,25	0,00	0,00	2,11	1,87	0,28	0,20	3,51	0,63	0,00	0,07	0,17	26,43	30,04%
Higher Education Institutions research units	7,25	0,20		0,13			0,65	0,08	1,23	0,98	0,58	1,46			1,40	1,30	0,28	0,07	2,68	0,56		0,07	0,06	18,98	21,57%
Technology and innovation centres (non-profit)	0,61	0,03		0,25			0,07		0,28			0,31			0,32	0,06		0,07	0,09				0,06	2,14	2,44%
Other non-profit research organizations (not HEI)	1,66	0,20		0,13			0,07		0,79	0,06	0,13	0,48			0,39	0,51		0,07	0,73	0,06			0,06	5,31	6,04%
Public Organizations	0,51	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,23	0,34	0,00	0,00	0,46	0,00	0,00	0,07	0,06	1,67	1,89%
Public Research Organizations	0,51														0,23	0,34			0,46			0,07	0,06	1,67	1,89%
Federal Institutions with R&D activities																								0,00	0,00%
Public Administration																								0,00	0,00%
Other Public Actors																								0,00	0,00%
Other Organizations	4,11	0,03	0,00	0,00	0,00	0,00	0,57	0,08	0,55	2,35	1,66	0,41	0,25	0,00	0,61	0,00	0,29	0,23	0,70	1,30	0,00	0,00	0,00	13,14	14,94%
Associated Professional Networks																								0,00	0,00%
Scientists/Researchers (as individuals)	3,98	0,03					0,57	0,08	0,55	2,35	1,66	0,41	0,25		0,61		0,29	0,23	0,57	1,30				12,89	14,65%
Interest Organizations																								0,00	0,00%
NGOs	0,13																		0,13					0,25	0,28%
Weight of instruments	25,58	2,78	0,87	4,50	0,00	0,00	6,23	0,25	13,80	3,62	2,37	5,65	0,50	0,00	5,27	2,93	3,28	1,17	5,63	3,03	0,00	0,20	0,33	88,00	
Relative weight of instruments	29,07%	3,16%	0,98%	5,11%	0,00%	0,00%	7,08%	0,28%	15,68%	4,11%	2,69%	6,42%	0,57%	0,00%	5,98%	3,33%	3,73%	1,33%	6,40%	3,45%	0,00%	0,23%	0,38%		

Table 7 : The Organizations – Objectives Matrix

Objectives	Creative Capacity						Transfer Capacity						Absorptive Capacity							
Organizations	Upstream Innovative Activities	Technology Acquisition	Fundamental R&D	Applied R&D	Government R&D	Downstream Innovative Activities	Knowledge Exchanges	Technology Exchanges	Knowledge Transfer	Technology Transfer	Knowledge Networking	Technology Networking	Receptivity to Knowledge/Technology	Accessibility to Knowledge/Technology	Acquisition of Knowledge/Technology	Distribution of Knowledge/Technology	Updating Knowledge/Technology	Implementation of Knowledge/Technology	Weight of Specific organizations	Relative weight of organizations
Business Organizations	6,60	1,50	0,17	5,67	0,00	3,00	1,17	0,67	5,27	1,08	0,33	0,33	5,83	2,08	4,50	0,50	4,50	2,00	45,20	51,36%
All companies	0,10	1,00		4,67		1,50	0,17	0,67	4,77	0,50	0,25	0,25	2,11	0,25	2,00	0,50		1,00	19,73	22,42%
Small and Medium Enterprises	6,50	0,50		1,00		1,00	1,00			0,58			2,75	1,83	2,25		3,00	1,00	21,42	24,34%
New technology based firms / New knowledge intensive service firms									0,50				0,11						0,61	0,69%
Business organizations per se (Chambers of commerce…)											0,08	0,08	0,11						0,28	0,32%
Firms that do not perform R&D yet																			0,00	0,00%
International companies establishing on national territory																			0,00	0,00%
Consultancies and other services providers (non profit)			0,17			0,50							0,75		0,25		1,50		3,17	3,60%
Venture Capital providers																			0,00	0,00%
Education Organizations	0,00	0,00	0,33	0,50	0,00	0,00	0,00	0,00	0,17	0,00	0,33	0,00	0,22	0,00	0,00	0,00	0,00	0,00	1,56	1,77%
Higher Education Institutions (Education function)			0,25	0,42					0,17		0,33								1,17	1,33%
Other Public Education Institutions (Secondary…)			0,08	0,08									0,11						0,28	0,32%
Private Institutions for Education / Lifelong learning													0,11						0,11	0,13%
Students, teachers and general public																			0,00	0,00%
Research and Technology Organizations	0,80	0,00	5,58	1,25	1,00	0,50	0,42	0,17	6,38	1,17	4,67	0,58	1,67	1,92	0,33	0,00	0,00	0,00	26,43	30,04%
Higher Education Institutions research units	0,60		4,92	0,75	1,00	0,50	0,42	0,17	4,52	0,58	3,50	0,25	0,78	0,83	0,17				18,98	21,57%
Technology and innovation centres (non-profit)	0,10		0,25	0,08					0,60		0,25	0,25	0,11	0,50					2,14	2,44%
Other non-profit research organizations (not HEI)	0,10		0,42	0,42					1,27	0,58	0,92	0,08	0,78	0,58	0,17				5,31	6,04%
Public Organizations	0,00	0,00	0,42	0,58	0,00	0,00	0,00	0,00	0,00	0,00	0,33	0,00	0,17	0,00	0,17	0,00	0,00	0,00	1,67	1,89%
Public Research Organizations			0,42	0,58							0,33		0,17		0,17				1,67	1,89%
Federal Institutions with R&D activities																			0,00	0,00%
Public Administration																			0,00	0,00%
Other Public Actors																			0,00	0,00%
Other Organizations	1,60	0,00	4,00	0,00	0,00	0,00	1,42	0,17	3,18	0,25	1,83	0,08	0,11	0,00	0,50	0,00	0,00	0,00	13,14	14,94%
Associated Professional Networks																			0,00	0,00%
Scientists/Researchers (as individuals)	1,60		4,00				1,42	0,17	3,18		1,83	0,08	0,11		0,50				12,89	14,65%
Interest Organizations																			0,00	0,00%
NGOs										0,25									0,25	0,28%
Weight of specific objectives	9,00	1,50	10,50	8,00	1,00	3,50	3,00	1,00	15,00	2,50	7,50	1,00	8,00	4,00	5,50	0,50	4,50	2,00	88,00	
Relative weight of objectives	10,23%	1,70%	11,93%	9,09%	1,14%	3,98%	3,41%	1,14%	17,05%	2,84%	8,52%	1,14%	9,09%	4,55%	6,25%	0,57%	5,11%	2,27%		